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TS 1000

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TS 2068

THE SINCLAIR/TIMEX USERS MAGAZINE**\$2.50****Volume IV****FEBRUARY 1986****Number 2**

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True 64 Columns on the 2068

Reviewing the OS-64 Plug-In Cartridge

OS-64 is a plug-in cartridge that gives the 2068 a 64 column display operating system and includes full size printer software that supports Aerco, Tasman, A & J, and Oliger Centronics printer interfaces. The cartridge plugs into the cartridge dock on the front of the 2068 and is, in effect, the 2068 ROM with new routines to give the 64 column display and drive a full size printer.

The 64 column is the true extended video mode as mentioned in the 2068 manual and includes LISTing, LLISTing, PRINTing, LPRINTing, and editing in 64 columns. COPY is also supported on Epson compatible printers.

LISTing your program is much more enjoyable in 64 columns because most lines are less than 64 characters long and you don't have to deal with wrap around as often as you do in 32 column mode. The same is true when you print something out on a large sized printer. Basically, what you see on the screen is what you get on the printer.

When you turn on the 2068 with the OS-64 in place, it initializes in the usual way and then re-initializes with black background and white letters and a third copyright with Zebra's name. The system initializes supporting the Aerco interface with only a POKE to change to another interface. You can also change the type of codes sent, output width, linefeed & carriage return, and centering. OS-64 is also compatible with the Zebra disk drive system.

Graphics are just the same as they were in 32 column mode even though you actually have 512 pixels across now. Because you have two display files with OS-64, screen saving requires two separate blocks of code to be saved. Loading a screen would then also require two loads.

OS-64 has many advantages but there are some limitations with it. First, You must have either an RGB monitor or a good quality monochrome monitor. The letters are smaller in 64 column mode and are not very clear on a TV or color monitor. You can only have two colors on the screen at a time, your choices are only:

Black & White
Blue & Yellow
Red & Cyan
Magenta & Green

If you set the INK or PAPER to the color you want, The PAPER or INK is set to its complimentary color as given above. BORDER, FLASH, and BRIGHT are ignored. I did notice a bug when the computer tried to execute FLASH and gave an error message of "Nonsense in BASIC" the others were ignored. Also, embedded colors in your listings will change the whole screen as they are encountered when listing a program.

The cursor also does not flash which can be a nuisance when you have a page full and are trying to find where you are. You also cannot see the border changing colors as you load a program from tape. And because of the extra memory required for the extra display file and system variables, you have about 5K less memory to work with. And because of this new organization of memory, a lot of machine code programs such as TASWORD and PROFILE will not LOAD. Otherwise, any BASIC program thats not too big will load and run OK.

Even with these drawbacks, you have one of the most powerful operating systems ever and fulfills one of the original promises from TIMEX to the best of its ability. As a developmental system for designing your own professional-looking programs, it can't be beat.

As far as programs available for OS-64, I have seen several which include OS-64 PERSONAL SECRETARY, OS-64 UTILITIES #1, and SMART TEXT OS-64.

PERSONAL SECRETARY

PERSONAL SECRETARY is an appointment minder with calander, phone number record keeping, and label generator. Because it operates in 64 column mode, there is plenty of room for a monthly calendar, a menu, and current data. The calendar can be any month from the year 1500 to the year 2200.

In the appointment mode, you can make up to 200 entries telling you where you should be and with whom and why. The current month is displayed in the upper left corner and the menu in the upper right and data displayed below.

In the phone number mode, you enter the name, address, and phone number and can add up to 50 of these. The mailing label section pulls from the phone number section to make up the mailing list. You can print out the data from any mode to your printer at any time.

Hopefully, PERSONAL SECRETARY is the first of a long list of software to come out for OS-64. PERSONAL SECRETARY by J & A Software is distributed by Zebra Systems.

SMART TEXT OS-64

SMART TEXT OS-64 is a word processing program that uses OS-64 for its 64 column display and printer driver routines.

SMART TEXT OS-64 features data base management, word processing, mailing lists, office tools such as page headers and page numbering, repeat printing, and data files manager. SMART TEXT TS-2068 is also available for non-OS-64 users.

SMART TEXT has many menus and allows easy access to all features. A comprehensive manual is included which gives many examples and covers the general use of this powerful program. SMART TEXT is written entirely in basic which makes it a little slower than most other word processors, but its extra features make up for it.

SMART TEXT is available from Gulf Micro Electronics, 1317 Stratford Ave, Panama City, FL 32404 (904) 871-4513.

OS-64 UTILITIES #1

OS-64 UTILITIES #1 contains six routines to greatly enhance the OS-64 operating system. "BIGCOPY" is an alternate COPY routine that will provide a full page (enlarged) screen COPY for Epson compatible printers. The COPY is turned on its side to fill up the entire page.

"OPTBOLD" is an alternate character set which provides a bolder character set for better visibility on the screen. A screen COPY will also show the new character set. - A great improvement!

"FDDRS232" will allow you to use port A of the Zebra Disk Drive system with your

serial (RS232) printer. LLIST, LPRINT, and COPY are all supported.

"BIGCHAR" gives you the ability to print three different enlarged character modes on the screen through BASIC. All you have to do is set the column and line where you want the text to begin, set the mode, give the string of text you want printed, and a USR call will do it.

"OLIVCOPY" is a COPY routine for use with the Olivetti printer. A must for those who bought the Olivetti Ink Jet printer.

"EDITOR64" is a BASIC routine (or module) which is the beginnings of a text editor which includes full cursor control, flashing cursor, and auto-repeat. A full explanation and LISTing is provided to help you design your own word processor-type program.

All the routines can be used simultaneously. Of course the more you use, the less memory you have left for your own program. OS-64 UTILITIES #1 is a must for the complete 64 column system and is available from Zebra Systems.

One utility that has not been provided as of yet is one that will allow you to use the 2040 printer with OS-64. All the ads state that you cannot use the 2040 printer, the fact is you can! All you need is a few simple POKES and OUT commands.

When the 2068 powers up, it checks to see if there is a cartridge in the cartridge dock if there is, it bank switches it in to the proper memory position. In OS-64's case it switches into the 0-16K memory position - where the 2068 ROM resides normally. Since both the 2068 and OS-64 ROM are pretty much the same except for the screen print and printer routines, you can easily switch back and forth between the two operating systems.

Once initialized into OS-64 mode, you can use OUT 144,0 to return to the 2068 ROM and OUT 255,0 to return to normal video mode. You are now back in the standard 2068 ROM mode, but with the system variables still in OS-64 mode, so if you had the 2040 printer hooked up and tried to use it now, it would crash because the ROM would be calling the wrong printer driver routine.

To correct the printer driver ROM call, we need to find where the Channel (CHANS) data resides now and change the ROM call. Looking in appendix D, we see that the address of the channel data is held in location 23631 & 23632. PEEKing these

locations, we find that the channel data is now at $0 + 256 * 123$ which equals 31488 as opposed to 26688 which is where it normally is.

The address of the printer driver routine is held in the 16 & 17th address from the start of the CHANS table or 31503 & 31504. If we PEEK these now, we find that they contain 74 & 61 respectively. To use the 2040 printer, you need to POKE 31503,0 and 31504,5. Now the 2040 printer will print! To return to OS-64 mode, use OUT 244,3 and OUT 255,62. If you are going to use a large printer, you will also need to POKE 31503 & 4 back to their original numbers given above.

LLIST and LPRINT work as normal but COPY will NOT copy all 64 columns, only every other one, or the contents of display file one. Also, be sure and send an LPRINT before any text is sent to clear the printer buffer.

The best way to use the 2040 printer from OS-64 column mode is to just have a line that states OUT 244,0: POKE 31503,0: POKE 31504,5:LPRINT and then send any print commands you need and finish with OUT 244,3: POKE 31503,74: POKE 31504,61. If all you are using is the 2040 printer, the first POKES given are all that is

needed and can be done just once. Using only OUT 244 will keep the screen from changing its display while you switch ROMs. See printer examples.

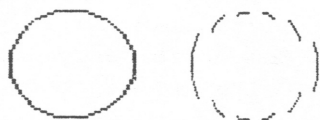
If you wish to watch the border change colors as you load a tape, you can use OUT 255,0 to return to normal video mode. But be ready for only every other letter being displayed in the title. This is because all tape routines are in the 2068's extension ROM and it checks to see if there is a cartridge in the cartridge dock also; meaning that it returns to OS-64 column mode with 32 column screen display! To return to 64 column display, use OUT 255,62 or any multiple of $8 + 6$. (Try 54).

OS-64 is available from Zebra systems, Inc., 78-06 Jamaica Ave., Woodhaven, NY 11421. (718) 296-2385.

-- Joe Williamson

```
10 PRINT "We are now in 64 column mode"
12 CIRCLE 150,150,20
15 LLIST
20 OUT 244,0: POKE 31503,0: POKE 31504,5
30 PRINT "We are now in""32 column mode"
35 LPRINT : LPRINT "We are now in 32 column mode and support
the 2040 printer"
50 LLIST : LPRINT
55 CIRCLE 150,90,20
60 COPY : LPRINT "The above is from the 2040 printer using OS-
64"
70 POKE 31503,74: POKE 31504,61: OUT 244,3
80 LPRINT "": COPY : LPRINT "The above is from a large printer
using OS-64"
```

We are now in 64 column mode
We are now in
32 column mode



The above is from a large printer using OS-64

```
We are now in 32 column mode and
support the 2040 printer
10 PRINT "We are now in 64 col
umn mode"
12 CIRCLE 150,150,20
15 LLIST
20 OUT 244,0: POKE 31503,0: PO
KE 31504,5
30 PRINT "We are now in""32 c
olumn mode"
35 LPRINT : LPRINT "We are no
w in 32 column mode and support
the 2040 printer"
50 LLIST : LPRINT
55 CIRCLE 150,90,20
60 COPY : LPRINT "The above is
from the 2040 printer using OS-
64"
70 POKE 31503,74: POKE 31504,6
1: OUT 244,3
80 LPRINT "": COPY : LPRINT "T
he above is from a large printer
using OS-64"
```

We are now in 32 column mode
We are now in
32 column mode



The above is from the 2040 printer using OS-64

Disks & Memory for the QL

The Technology Research Delta Interface

The Sinclair QL computer is a great small business and home productivity computer. However it lacks a few items that would greatly enhance its usefulness. It has no centronics parallel printer port. Its memory is too small for much serious work. And it has only microdrives for mass storage and retrieval.

Technology Research, a leader in the production of disk drive systems for the Spectrum in England, has introduced the "Delta 3-in-1" Interface to address these deficiencies. Consisting of a board about 6" long, the 3-in-1 plugs into the left end of the QL at its expansion buss. Only about 3" extends outside the QL case and is covered with a black plastic shroud to blend in with the design of the computer.

The interface is appropriately named "3-in-1" because it has built-in printer interface, disk interface and additional memory. Another version is available without the extra memory but which can be upgraded later. SUM's version came with 128K on board.

This board is a very welcome addition to our QL. The extra memory greatly expands the workspace available for use with Quill and the other QL software. For example, without extra memory, Quill can only produce documents of about 1100 words before "Memory Full" comes up. With the extra 128K, text files in excess of 11,000 words were created (about 41 double-spaced typed pages) in memory at one time! The extra memory can also be configured as a "Ram Disk", setting aside a part of memory where programs or data can be saved or loaded to and then quickly accessed. Of course, you must save to microdrive anything put into Ram Drive as it is erased when the computer is turned off. Working in conjunction with the on-board parallel interface, part of memory can be set aside for use as a printer buffer. For example, 2K of memory could be designated as a buf-

fer, meaning that once something is sent to the printer, control of the computer is returned to the user while the job to be printed is being fed to the printer from this buffer.

The parallel interface is more useful than the serial ports which come with the QL since most inexpensive printers available today have the parallel port. An error in the Delta documentation prevented the use of the interface for several days. In an effort to make up a printer cable to match the pinouts of the interface, it was discovered that the pinouts listed were not correct. Instead a standard printer cable can be used of the type used on the Tasman interface and LPrint III Spectrum interfaces. This particular cable is also available at Radio Shack for the Model 100 computer. An added extra is the ability to use the parallel output in programs that call for serial by typing "PAR_USE ser".

The disk drive interface is basically identical to the system reviewed in the December issue of SUM made by Kempston. It seems that the operating system for both was written by the same person. The disk interface will support up to 4 single or double sided, single or double density, 3" or 3.5" or 5.25" disk drives. By using a simple command, the drives can fully emulate the QL microdrives. Supplied on a 5.25" diskette with the Delta interface is a conversion program which claims to automatically transfer software from microdrive to disk. A 28 page user's manual is supplied with the system.

English Micro Connection and Knighted Computers carry the Technology Research Delta Interface at about \$270.00 with 128K of memory. Other configurations are available. As compared to buying a parallel interface, disk interface, and 128K of extra memory all separately, this is a great price.

-- Richard Cravy

Ten Place Accuracy on the TS1000/1500

Greater Mathematical Precision

This programming exercise was used in a presentation of a project aimed at developing a double precision TS 1000/1500 subroutine.

-- Donald Dean

The TS 1000/1500 computers (and many others) do calculations to 9 or 10 significant figures. As described at the end of Chapter 4 in the TS 1000 manual, the ROM's floating point arithmetic uses a 32 bit mantissa for a decimal accuracy of $32 * \ln 2 / \ln 10$ which equals 9.63 digits. However, in order to limit printout to 14 spaces, only 8 significant places are printed.

For my engineering work, I often prefer to see all ten figures the computer is using rather than the rounded eight places normally printed. The main purpose of this article is to present the subroutine (line 1000) used to print numerical variables rounded to ten significant places in scientific notation in lieu of using the TS 1000 ROM routine which rounds to eight places and uses scientific notation only if N is as described in line 1052. A secondary purpose is to present a subroutine (line 1050) which 'normalizes' the variable to scientific notation regardless of its magnitude.

Lines 5 to 35 contain a small sample program which uses the Ten Place subroutine repeatedly to evaluate formulas comprised of numbers, previously defined variables and functions. Line 2000 is useful for determining the size of the variable area.

As shown, the program prints five lines to the screen, asks for the formula and repeats it, gives the variable and the variable minus it's seven most significant digits in scientific notation (after gaining confidence in the program, this should be eliminated by deleting line 1072), prints variable in normal fashion (eliminated by deleting first part of line 1024), and the variable to ten places in scientific notation.

```

5 REM TEN PLACE ACCURACY
7 REM BY DONALD L. DEAN
10 PRINT " INPUT F$ ";
15 INPUT F$
20 PRINT F$
25 LET N=VAL F$
30 GOSUB 1000
33 PRINT
35 GOTO 10
1000 REM PRINT 10 PLACES
1002 GOSUB 1050
1004 FOR J=2 TO LEN N$
1006 IF N$(J)<>"E" THEN NEXT J
1007 IF J<=3 THEN GOTO 1024
1008 LET N$=N$( TO J-2)+N$(J TO
)
1010 LET M=ABS N-ABS VAL N$
1012 LET V=N
1014 LET V$=N$
1016 LET N=M
1018 GOSUB 1050
1020 LET N=V
1022 LET N$=V$( TO J-2)+STR$ (IN
T (100*VAL N$( TO 5)+.5))+V$(J-1
TO )
1024 PRINT "N=";N,,"N$=";N$
1026 RETURN
1049 STOP
1050 REM NORMALIZE
1052 IF ABS N<=1E-6 OR ABS N>=1E
13 THEN GOTO 1070
1054 IF ABS N>=1 THEN GOTO 1062
1056 FOR I=1 TO 5
1057 IF ABS N*10**I<1 THEN NEXT
I
1059 LET N$=STR$ (N*10**I)+"E-"+
STR$ I
1060 GOTO 1072
1062 FOR I=0 TO 12
1064 IF ABS N/10**I>=10 THEN NEX
T I
1066 LET N$=STR$ (N/10**I)+"E"+S
TR$ I
1068 GOTO 1072
1070 LET N$=STR$ N
1072 PRINT "N$ (LOOP) =" ;N$
1073 RETURN
2000 PRINT "VARIABLES AT ";PEEK
16400+256*PEEK 16401;" TO ";PEEK
16404+256*PEEK 16405
2005 RETURN

```


Adding RGB to Your 2068

Crisp, Beautiful Color Economically

RGB on the 2068 is probably one of the most gratifying additions you can get. The problem is that there is no simple way to do it and few companies (if any) have any to sell. E. Arthur Brown at 1702 Oak Knoll Dr, Alexandria, MN 56308 did have one they were selling for \$19.95 which installed inside the machine, stripped the sync from the video, and provided for RGB connections. The Timex Technical Manual also shows a way to add RGB by building a three transistor circuit to strip sync from the video for RGB operation.

The problem with stripping the sync from the video is that you don't always get a clean sync signal. Some of the video gets into the sync and causes tearing of the video. Performance also changes if you have something plugged into the video out jack of the computer, loading down the circuit.

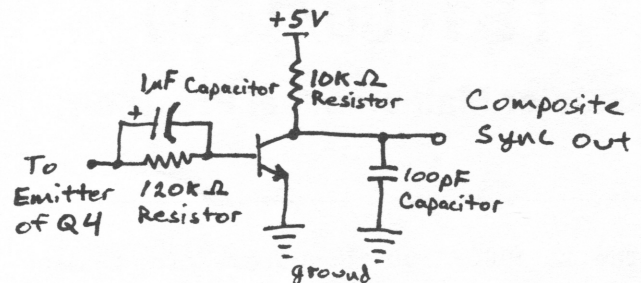
The best way is to get the sync at the source before any video is added - like the TC 2068 does (or did?). Inverted low level sync can be found on the emitter of transistor Q4 in the video circuit. All that is needed is to invert and amplify the sync to a peak to peak voltage of 5 volts which can be accomplished by a simple one transistor circuit.

WARNING: You must be very careful while going inside your computer to do any type of work to it. Be sure and disconnect the power before going inside. This is not recommended for a first time project.

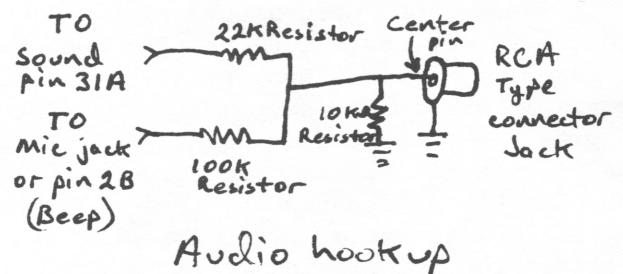
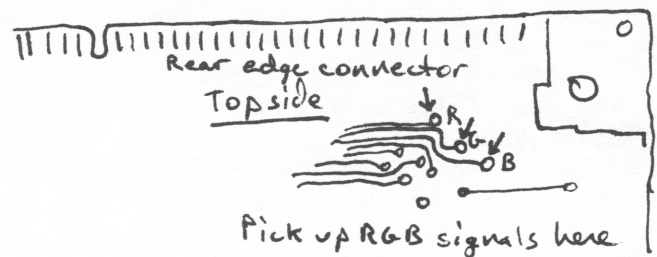
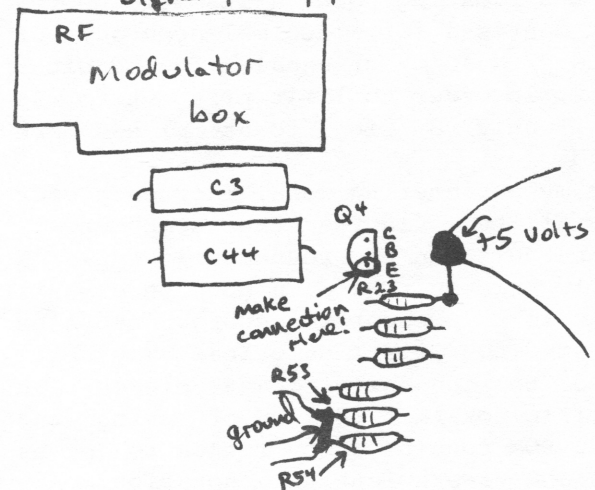
This circuit will provide the type of sync that most RGB monitors require such as the Sears 14 inch RGB monitor, the Magnavox (NAP) model 40 and model 80 RGB monitors, or any monitor that accepts negative-going composite (or horizontal) sync.

The RGB signals are available on the rear edge connector at B27, B28, & B29, and ground at B32. For internal connections, see diagrams. Because the circuit is so simple, they can be mounted freestyle on the printed circuit board. Just take care that they stay close to the board to prevent accidental shorting against the top cover or other components.

Simple RGB Circuit



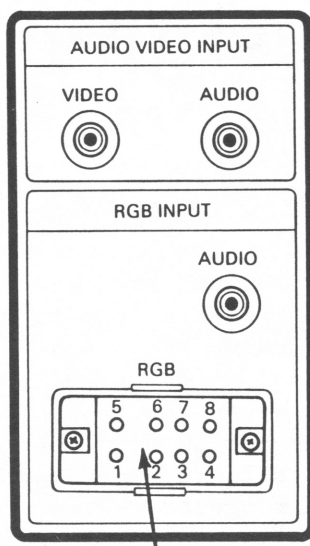
Signal pickup points inside 2068



To keep this compatible with other Sinclair computers such as the QL and the Spectrum 128 which both have built-in RGB interfaces, an eight-pin "DIN" plug and socket should be used with connections as shown. The eight-pin "DIN" socket can be easily mounted on the rear plastic casing by notching the top and bottom case with wire clippers till the cases will fit back together with the connector between the two.

Shown are three cables, one for the Sears RGB/TV monitor combo, one for the Magnavox, and one for using the QL with a monochrome monitor. All the plugs and sockets should be numbered. Follow the diagram and wire the ends of the cable so that they match up to each other. On the Magnavox cable, you need to mark the ends so that they are not reversed (both ends will have an eight-pin "DIN" plug on it).

An audio jack can also be mounted and connected as shown in the diagram for SOUND and BEEP to be heard through the monitor's audio amp if available.

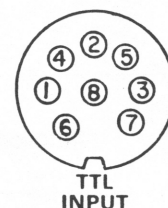


Sears RGB Cable

8 pin DIN	Signal	Sears Connector
2	Ground	5+6
4	Comp. Sync	7
6	G	3
7	R	2
8	B	4

PIN ASSIGNMENTS

PIN NO.	TTL INPUT 8 PIN SIGNAL
1	IBM Open/Apple Gnd.
2	Red
3	Green
4	Blue
5	Intensity
6	Ground
7	Horiz. Sync
8	Vert. Sync



Magnavox RGB Cable

8 pin DIN Computer	Signal	8 pin DIN Monitor
2	Ground	6
4	Comp. Sync	7
7	R	2
6	G	3
8	B	4

QL Monochrome Monitor Connection

8 pin Din	Signal	RCA-Type Plug
3	video	center pin
2	ground	outside (shield)

Keep all leads as short as possible, use a shielded cable to the monitor - particularly if you make it very long. Once you have everything hooked up, turn on the computer. It should come up with a white screen and no rolling. Try BORDER with all the colors to make sure they are wired in the right order. If you got everything right, you can now enter the new world of sharp, brilliant displays, and less eye strain!

We had quite a few inquiries as to where to purchase the Magnavox (NAP) RGB Monitors as mentioned in the December issue. They can be found at Service Merchandise which is a chain of catalog showrooms throughout the US. For the

location of the one nearest you or to order a monitor over the phone, dial toll-free 1-800-726-4636. We have also learned that Best Products Co. Inc. also carries them at 1-800-221-BEST. They both have had the model 40 on sale for \$199.95.

pin	function	signal
1	PAL	composite PAL
2	GND	ground
3	VIDEO	composite monochrome video
4	CSYNC	composite sync
5	VSNC	vertical sync
6	GREEN	green
7	RED	red
8	BLUE	blue

Service Merchandise also now has a higher resolution RGB monitor called the Magnavox RGB 80 for \$277. The Magnavox 40 works quite well with the 2068 with OS-64 though. They also have a nice Amber monitor for \$99 which also works well with OS-64.

-- Joe Williamson

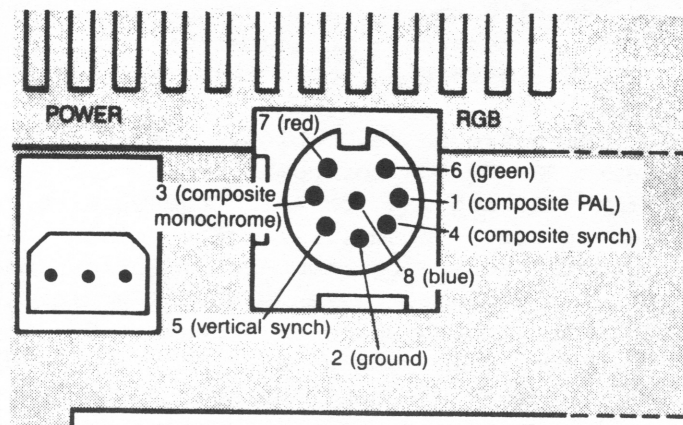


Diagram of Monitor Connector as Viewed from rear of QL. Showing pin numbers and functions.

Greeting Card Designer

A Useful Graphics Program from Zebra

GREETING CARD DESIGNER is a sophisticated program that allows you to design and print out on your Epson compatible printer, beautiful greeting cards. The front and inside page can both be personalized with your own borders, graphics, and phrases.

A graphic library of 23 graphic characters including christmas trees, bells, grads, and flowers gives you something for every occasion. You also have eight borders to choose from and two font styles, open and solid. You also have two sizes of text to choose from and the choice of how you want the text to be centered on the card.

Use of the program is easy and straight forward. The program leads you through with simple menus and prompts. You simply tell it what printer you are using, and then asked what page you want to do first. The screen becomes the page you are working on. You type the text you want to appear with full screen cursor control, choose the type of border you want, select the graphic you want, put an x on the

screen where you want it, and repeat for the inside page. You can then choose how many copies you want and send it to print.

When it prints out, the first image you see is the inside page and is printed upside down and in one corner of the page. The next image you see is the outside page and is in the opposite corner, right-side up. When you fold it into quarters with the perforated edges torn off, everything falls into place and voila! instant greeting card! Zebra also sells brightly colored tractor feed paper and matching envelopes in blue, red, and green.

The second program that comes with it is a graphics designer for designing your own graphic pictures. You can load existing graphics and modify them or create your own. Upon loading, you are greeted with a grid and a flashing cursor which you move around and build your own pictures. The image is three times normal size.

After you have made your own, you can COPY the image to your 2040 printer to see



what it will look like at normal size and then save it for future use on your library tape of graphics. Zebra is also planning future library tapes with new graphics on them.

It looks like Zebra has done it again with another very professional program. Like Tech Draw, it is up there in the same league as its MacIntosh counterpart.

Available from Zebra Systems, Inc.
78-06 Jamaica Ave., Woodhaven, NY 11421
(718) 296-2385

-- Joe Williamson

Vendor Reports

The Quickey 2068 is a keyboard overlay with legends printed on and available for TASWORD II/TASPRINT and MSCRIPT. Coming soon, one for OMNICALC, and others. Blank ones are also available. Price: \$3.99 each, or two for \$7.50. Blanks for \$3 ea. Available from AN-TO Productions, 9009 West Elm St. #2 Phoenix, AZ 85037

TASWORD THREE! Many Spectrum and 2068 owners have been quite happy with the Tasword II word processing program from Tasman software in England. Now a new version is being released. It operates only with microdrive, has mail-merge capabilities, allows up to 128 characters per printed line, tabs, and automatic paging and numbering. No word yet on when it will land on these shores.

The SPECTRUM 128 has been officially announced in England and will be available from the English Micro Connection shortly. Our reviews in the December and January SUM were of the Spanish version, but the English version seems to be little different. More information available from EMC.

TAD PAINTER has re-released its SPEECH SYNTHESIZER software with new, clearer documentation. This software is very impressive in that it would allow words to be incorporated into games or business software--words spoken by the computer. We hope to have a review in March. Painter is at Box 166055, Irving, TX 75016. Price is \$16.95 for either 2068 or TS-1000.

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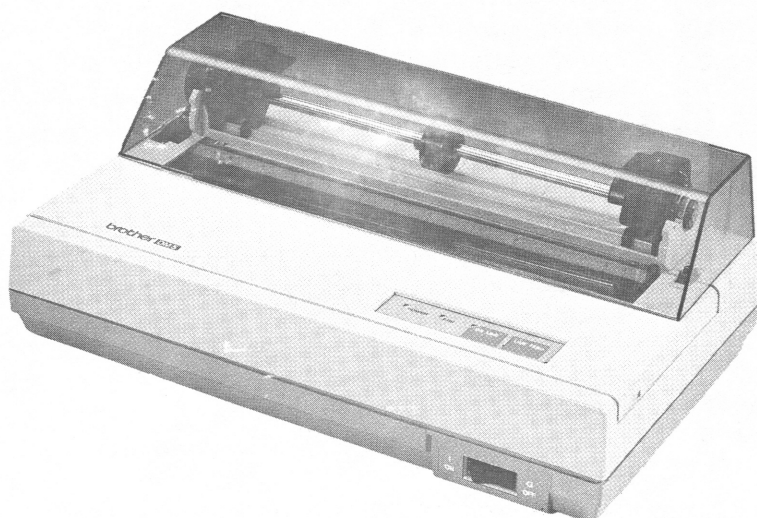
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attn: Frank Davis.

Don't Buy a Gorilla Banana!

For several years the "famous" Gorilla Banana dot matrix printer and its clones have been popular with Timex/Sinclair users. The reason was simple — **it was cheap!** Recent magazine ads have even been seen advertising models of this printer for under \$100. But the disadvantages of the Gorilla printer were many: it had poor letter quality using only 5 x 7 dots for forming characters; it provided no true true descenders on letters like y, p, and g; it could not handle single sheets of non-computer paper; it was not particularly compatible with available interfaces and software; and it only offered one basic typeface along with the double-width of that face.

Introducing the Brother Dot Matrix Printer! for only \$139.95*!



shown with optional tractor feed

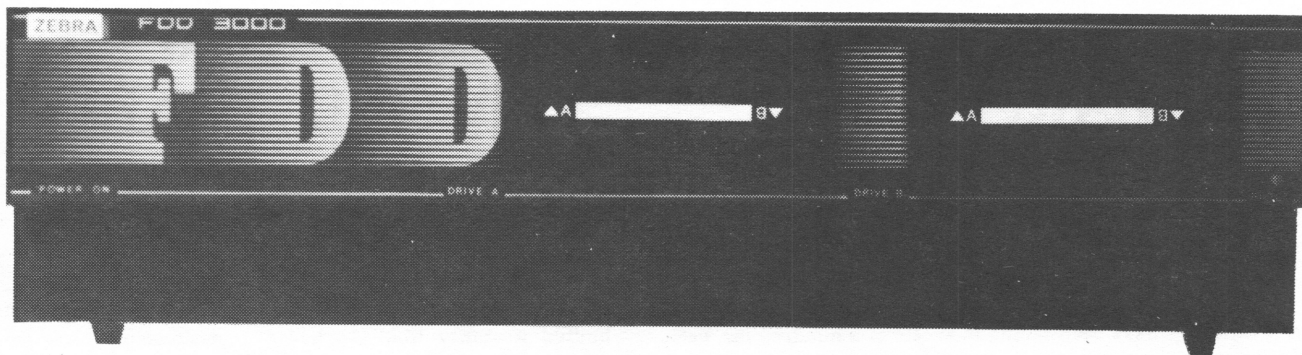
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ABCDEFGHIjklmnop1234567890
ABCDEFGHIjklmnop1234567890
ABCDe fgh i 12345
ABCDEFGHIjklmnop1234567890
ABCDEFGHIjklmnop1234567890
ABCDEFGHIjklmnop1234567890
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ABCDe fgh i 12345
ABCDe fgh 123 ABCDe fgh 123

actual print samples

The **Brother Dot Matrix Printer** is the best value on the market today! It operates on 110-120 volts, weighs but 6½ pounds, and is a very compact 3"x13"x7½" in size to save desk space. It prints at **50 characters per second** (about 35 seconds for a single double spaced page). It is **fully Epson compatible** and uses a **9 x 9** dot matrix pattern for true descenders. It prints on **any type paper** and has **friction feed**. It has **pica, elite, condensed, italics, double-width, sub and superscripts, bold, double-strike, underline. Full graphics capabilities** are built-in. It is fully compatible with Tasman, A & J, Rotronics, Aerco, and any other interface that supports Epson printers. It comes standard with **both parallel and serial interfaces** so that it will operate with the new Sinclair QL as well as all other Timex and Sinclair computers with appropriate interfaces.

***Price includes shipping (in U.S.A.) and all above listed features. Call about optional tractor feed. Florida residents must add 5% sales tax.**

**Foote Software — P.O. Box 14655 — Gainesville, FL 32604
904/462-1086**



THE BEST DISK SYSTEM FOR THE TS2068 JUST GOT EVEN BETTER!

New Packaging, Plus 64k

The best Disk System for the TS2068 just got even better! The FDD-3000 for the TS2068 retains all the features and compatibility with the original Zebra Disk System. The FDD-3000 contains the Power Supply, FDD Controller, and space for 1 or 2 disk drives in a compact attractive black metal case. This case is sturdy enough so that you can place a monitor or small portable Television on top to give that IBM-like high-tech appearance. The FDD-3000 features the same Intelligent Controller as the original FDD, but with an expanded Internal RAM of 64k. Yet it is still 100% software compatible with the original FDD.

Like our original Disk System, the FDD-3000 is compatible with all of your existing TS2068 peripherals including the TS2040 and Alphacom/32 thermal printers, the WC2050 modem, Aerco CPI, Tasman CPI, A&J Microdrives, Zebra Talker, Zebra Graphics Interface, Z-Stick, Z.A.D., OS-64 Cartridge and more! The FDD-3000 is available in one-drive and two-drive models. Each drive stores 160k of data per side of a diskette for a total of 320k per disk.

FDD-3000 64k CP/M 2.2 Option

Available as an option to the FDD-3000 is the 64k CP/M 2.2 operating system from Digital Research. While the FDD-3000's T.O.S. operating system is one of the most powerful disk operating systems available for a personal computer, the CP/M option for the FDD-3000 will let you access the large library of CP/M-80 business and personal software.

The CP/M 2.2 option includes a terminal emulator program which allows your TS2068 to run CP/M in 64 column mode (High-Res Amber or Green monitor recommended.). A Driver is included to use your 80-column printer from CP/M through the FDD-RS232 port.

FDD-3000 Spectrum Mode Option

An additional option is available for those who wish to run Spectrum software on their FDD-3000. When coupled with a Spectrum Emulator it allows you to LOAD, SAVE, and RUN Spectrum software from FDD-3000 Disk.

FDD-3000 Single Drive System

Single Drive starter system includes: FDD-3000 with One 3" floppy drive, TS2068 Interface, T.O.S. operating system disk, and user's manual.

Catalog #: C550 FDD-3000-1 Price: \$375.00

FDD-3000 Dual Drive System

Same as above, but with two 3" disk drives.

Catalog #: C551 FDD-3000-2 Price: \$425.00

FDD-3000 64k CP/M 2.2 Option

Includes 64k CP/M 2.2 System Disk, 64 Column Terminal Emulator, and user's manuals.

Catalog #: C552 FDD-3000 CP/M Option Price: \$50.00

FDD-3000 Spectrum Mode Option

Switchable option to allow FDD-3000 to operate in Spectrum Mode. (Requires Spectrum Emulator, not included.)

Catalog #: C553 FDD-3000 Spectrum Option Price: Call

Catalog #: ZMU1 Deluxe Spectrum Emulator Price: \$29.95

Blank 3 Inch (360k) Floppy Diskettes

Catalog #: C504 Box of 5 3" Diskettes Price: \$19.95

Catalog #: C503 Box of 10 3" Diskettes Price: \$39.95

FDD RS232 Serial Printer Cable (Optional)

Catalog #: C505 FDD Serial Printer Cable Price: \$19.95

Original Zebra FDD 64k CP/M 2.2 Upgrade

Same as FDD-3000 option, requires return of FDD Controller to Zebra Systems for exchange/upgrade.

Catalog #: C510 FDD CP/M 2.2 Upgrade Price: Call

Original Zebra FDD Spectrum Mode Upgrade

Same as FDD-3000 option. Requires return of FDD Interface to Zebra Systems for upgrade. (Requires Spectrum Emulator, not included.)

Catalog #: C511 FDD Spectrum Mode Upgrade Price: Call

Original Zebra FDD Add-on Drive

Catalog #: C501 FDD Add-on Drive B Price: \$125.00

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Anchor Automation sold these fully assembled boards as surplus at an auction. They are untested and are offered on an AS-IS, NO-RETURN basis. Since we've announced the availability of these boards, we have been selling in excess of a hundred per week. Customers have reported that better than 2 out of three have been fully functional as received, and most of the others have been easy to repair.

Catalog #: W251 \$10.00 each, or 3 for \$25.00, 10 for \$70.00

9 Volt DC - 700ma Power Supplies

These are brand new Sinclair ZX-81 power supplies and are perfect for your ZX81, TS1000/1500, or for use with the modem boards above. Quantity discounts are available.

Catalog #: PS01 \$6.00 each, or 2 for \$10.00, 3 for \$12.00

RS-232 Conversion Kit For WC-2050 Modem Boards

The price of our untested & uncased modem boards is so reasonable that not only are they being used as modems, but also the boards and sometimes just their parts are being put to many other uses by creative Timex hobbyists and experimenters. One of the things we've done at Zebra Systems is develop a very simple circuit to change one of these Modem boards into a general purpose RS232 board, which can then be used to drive serial printers and other devices. We thought the idea was so simple and cost-effective that we're making it available as a product.

We are introducing a complete kit consisting of a small printed circuit board, 3 IC's, a DB-9 connector, other miscellaneous parts, and instructions. The board develops the negative voltage required for true RS232 and has proper Driver and Receiver chips. After installing our RS232 board with a pin and socket system right onto your modem board's 8251 Serial chip, all that remains is to make 3 trace cuts and add one jumper wire to complete installation. Clear instructions are provided with a discussion of the theory of operation and some simple BASIC and assembly language printer drivers.

A short experimenters guide to the WC2050 is included. It explains such things as how to change the address decoding to other port assignments, how to change baud rate under software control, and more.

The WC2050-to-RS232 Kit (Catalog #: C183) includes all parts and instructions necessary for installation and operation. A bare board for the modification is also available.

Catalog #: C183 WC2050-to-RS232 Kit Price: \$19.95

Catalog #: C184 PC Board and Instructions only Price: \$ 5.95

AS-IS ZX81 COMPUTERS

Many months ago we purchased a large quantity of returned ZX81 computers from a Sinclair Repair Depot. These computers were sent back to Sinclair for repair (in some cases by owners who simply could not load tapes or operate the computer properly.). These computers are offered on an AS-IS, NO-RETURN basis. We've been selling these returned computers to members of local Timex clubs who have reported that a large number of these ZX81 are already working, or can be easily repaired.

Catalog #: ZX81 \$10.00 each, or 3 for \$25.00, 10 for \$70.00

WC2050 MODEM SALE!

LAST 100 WC2050 MODEMS

Zebra Systems has purchased the entire remaining stock of fully assembled and tested WC2050 modems from Anchor Automation. These modems come complete with power supply, MTERM I software on cassette (see below), user's manual and a one year limited warranty from Anchor Automation. Hurry less than 100 units left!

Catalog #: W250

Originally \$119.00, Now Only: \$69.95

ZEBRA PUBLISHES MTERM

Zebra Systems has purchased the rights to publish the MTERM series of Terminal software for Timex computers with WC2050 modems.

MTERM/T for the TS1000/1500/2068

MTERM/T (also known as MTERM I) is a smart terminal program which has the following features: auto-dialing of phone numbers, change modem parameters, change Border, Ink, and Paper colors (TS2068 version only.). MTERM/T is supplied on tape with user's manual.

Catalog #: ST01

MTERM/T

Price: \$12.95

MTERM II for the TS2068

MTERM II is an advanced software package for your TS2068 equipped with the WC2050 modem. MTERM II features a 14 Number Auto Dial Directory, 27k Send/Receive buffer which can be erased, viewed, printed, or transmitted, 10 Macrokeys which hold up to 53 characters each for auto logon, codes, etc.. You can transmit and receive BASIC programs, and text from a BBS or another TS2068 Computer. MTERM II is also available on fast-loading Zebra Command Cartridge format.

Catalog #: ST02

MTERM II Tape

Price: \$29.95

Catalog #: ST2C

MTERM II Cartridge

Price: \$34.95

The Complete Guide to MTERM II By Barry Carter

This book tells you all you wanted to know about MTERM II. It details many features of MTERM II that were left out of the manual. A MUST-HAVE book for MTERM II owners!

Catalog #: C139 Complete Guide to MTERM II

Price: \$8.00

MINI XMOD 1.7 for the TS1000/1500

MINI XMOD 1.7 allows your Timex 1000/1500 or ZX-81 equipped with a Westridge 2050 modem to Up and Download programs to any XMODEM Protocol BBS (Like ZEBRA BBS). Includes 16k and 64k versions on cassette and User's manual. Requires a minimum of 16k of RAM.

Catalog #: WE01

MINI XMOD 1.7

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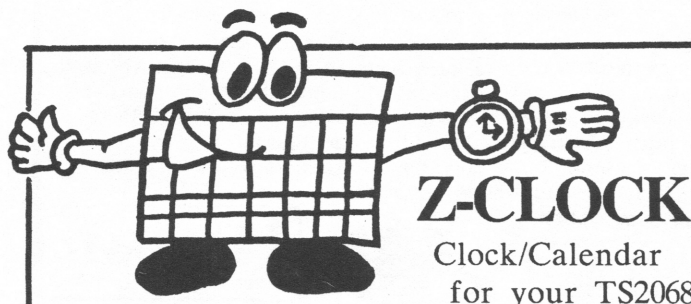
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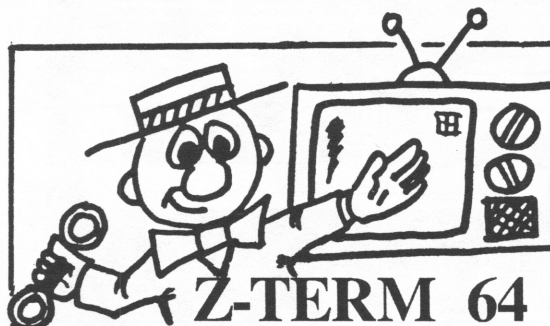
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The Z-Clock's built in battery back-up feature lets you keep track of time even when your computer is turned off. When you turn on your TS2068, the Z-Clock can tell it the YEAR, MONTH, DATE, DAY OF THE WEEK, and the TIME OF DAY down to tenths of a second with crystal controlled accuracy. The clock is easily accessed from BASIC or assembler. The Z-Clock features a 64-pin bus extension connector.

Catalog #: C400 Z-Clock Price: \$39.95



When we started shipping our OS-64 64-column operating system cartridge, the most often asked question was: "Will MTERM II work in 64 columns with OS-64?". Unfortunately, the answer was no. But now Z-Term 64 has arrived! And not only does it support 64 column operation, but also the entire list of most often requested modem features including: clearer menus and documentation than MTERM II, Auto re-dialing, built-in text editor, expanded upload and download features including ASCII conversion of BASIC programs, Xmodem protocol, and built-in 80 Column printer support for on-line printing. Z-Term 64 also supports ZEBRA Disk, A & J Stringy Floppy, and Cassette for storage of downloaded programs, text and data. Supplied on cassette with user's manual. (Requires OS-64, NOT INCLUDED) NOTE: Neither Z-TERM 64 or OS-64 support the 32 column TS2040 or Alphacom/32 thermal printers.

Catalog #: C278 Z-Term 64 Price: \$29.95

OS-64 64 Column Operating System Cartridge

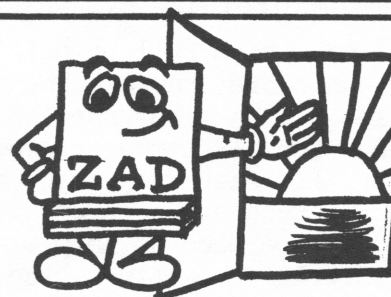
Catalog #: C271 OS-64 64 Column Cartridge Price: \$29.95



Zebra Systems is happy to introduce Z-Stick, the ideal companion to your Spectrum Emulator. Z-Stick is a joystick interface for use with Spectrum game software on a TS2068. Because Z-Stick is compatible with the famous Kempston Joystick Interface so popular in Great Britain, it is supported by the majority of British Spectrum Game Software. But that's not all. While our engineers were at it, we decided to throw in some additional features to add to your enjoyment. The Z-Stick includes two jacks for SOUND and BEEP; an L.E.D. power-on indicator so you can tell if you've left your TS2068 on even if your TV is off; and a computer reset switch to save wear and tear on both you and your computer's power switch. For those who don't already own a Spectrum Emulator, we have the Z-Stick PLUS, which includes a Spectrum Emulator for just \$10.00 more.

The Z-Stick interface works with your Timex TS2090 joystick or any Atari compatible joystick. Z-Stick attaches to the rear expansion-connector of your TS2068 and features a full 64-Pin feed-through expansion connector for maximum compatibility with your other TS2068 peripherals.

Catalog #:	C401	Z-Stick	Price: \$29.95
Catalog #:	C402	Z-Stick PLUS	Price: \$39.95
Catalog #:	C121	Atari Compatible Joystick	Price: \$ 9.95
Catalog #:	C147	Deluxe Joystick	Price: \$19.95



Experimenters rejoice! You can now get an inexpensive 8-Channel Analog-to-Digital interface for your TS1000, TS1500, TS2068 or ZX81 that opens the door to the real world. The manual includes sample applications and I/O software. Z.A.D. features a 46-pin feed-through connector for peripheral expansion. Each A to D channel has 8-bit resolution and 0-5 Volt full scale range. There are many good application suggestions for using A to D's in the following two books also available from Zebra Systems: Computer Interfacing Techniques in Science, Powerful Projects for the Timex/Sinclair.

Catalog #: C403 Z.A.D. Price : \$39.95

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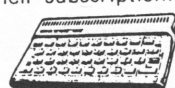
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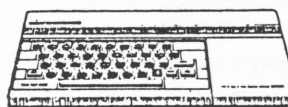
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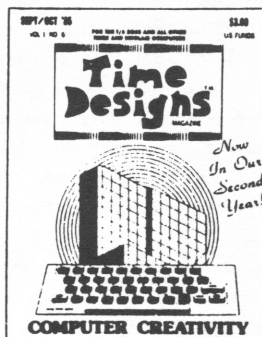
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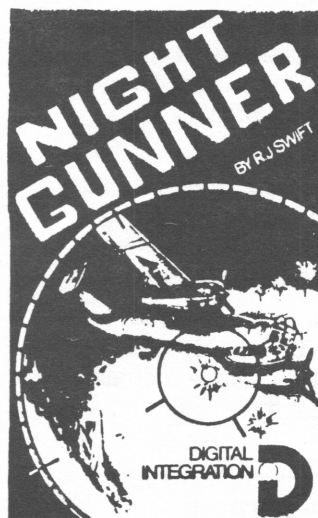
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